MARITIME DISRUPTIONS IN THE AUSTRALIAN-INDONESIAN WHEAT SUPPLY CHAIN: AN ANALYSIS OF RISK ASSESSMENT AND MITIGATION STRATEGIES

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ABSTRACT

Maritime operations perform a global interface function connecting international, regional and domestic supply chain networks within a transportation and distribution platform. Due to the pivotal role of trade, maritime operations have the potential to generate wide-scale disruptive effects along supply chains. Basically, various unwanted internal and external factors that create uncertainty and severe negative consequences in the maritime leg can be defined as maritime disruptions. This includes risks associated with safety and security, the environment, infrastructure, markets, organisation, and leadership factors. However, the short and long-term effects of maritime disruptions do not appear to be widely understood or in some cases even considered by supply chain entities. By exploring and understanding the causes and effects of maritime disruptions, supply chain entities may be better prepared to manage the challenges presented by maritime disruptions and recognising the benefits of developing disruption management strategies.

Due to the globalisation of wheat supply chains, the increased risk of maritime disruption has become a major limiting factor in the efficient movement of wheat from producers (wheat farmers) to global end consumers. This is also evident in the wheat supply chain between Australia and Indonesia, which is the context of this research. Despite wheat being one of the dominant seaborne trade commodities between the two countries, the wheat supply chain is complex because it utilises international shipping (ports in Australia to Indonesia) and the domestic maritime chain (via inter-island shipping in Indonesia). This thesis argues that the maritime leg of the wheat supply chain creates increased operational risks among entities in the wheat supply chain between the two countries. Therefore, the thesis focuses on one major research question: *Does the maritime leg contribute to disruptions in the wheat supply chain between Australia and Indonesia*?

To further examine this research question three sub-research questions are explored:

(i) *Are shippers and consignees aware of the disruptions that may occur in the maritime leg of the Australian-Indonesian wheat supply chain?*

(ii) *Are shippers and consignees in the Australian-Indonesian wheat supply chain implementing supply risk assessments or mitigation strategies to minimise the maritime disruption events?*

(iii) *Are current risk mitigation and detection processes in maritime operations effective in the Australian-Indonesian wheat supply chain systems?*

To address the above research questions, the study uses both quantitative and qualitative research approaches. These combined methods analyse the stages of disruptive events in maritime operations and identifies direct and indirect driving factors. The sample for the study consists of senior managers in the wheat supply chain from both Australia and Indonesia because of their key involvement in the decision making process after disruptions occur and when disruption management strategies are developed. The senior managers were interviewed via telephone using a structured questionnaire to obtain information on their perceptions of the risk of disruption, detailed processes of disruption discovery and recovery, and the probability levels of various disruption management scenario assessments. An overall response rate of 68 per cent (34 respondents) was achieved with each in-depth telephone interview averaging 32 minutes with a range of 15 to 90 minutes.

Data analysis is conducted in two stages. The first stage analyses the time and financial costs along the wheat supply chain of maritime disruptions in terms of probability, consequences, frequency rate and propagation effects both in Australia and Indonesia, including the role of third and fourth party logistics in both creating and managing maritime disruptions. In this stage, previous disruption management strategies during the three stages of maritime disruption: pre-, during and post-disruption are explored. The study finds the existence of 40 different disruptions in the wheat supply chain of which 17 disruptive events dominantly occur in the Australian-Indonesian wheat supply chain. The study also reveals that mitigation, adaptation, coordination and intervention are supply chain risk management strategies that are normally

implemented by entities in managing maritime disruptions along the wheat supply chain.

In the second stage, the Markov chain process was used as the prime means to evaluate the disruption management strategies based on four major business scenarios such as contingency plan, flexible inventory strategy, business continuity management, and recovery planning. Compared to other statistical methods, the Markov process enables the prediction of future consequences of maritime disruptions given a previous probability level that involves constantly changing occurrences of maritime disruptive events. In addition, the Markov decision process (MDP) combines. As a result of the MDP analysis, multi-disruption management scenarios are recommended to optimise financial and time costs of strategies implemented when maritime disruptions occur. The study also finds that farmers and final consumers are entities that are highly likely to experience maritime disruptions along the wheat supply chain, as the consequences of disruptions in the chain are passed on to them.

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GLOSSARY

AWB	Australian Wheat Board
ABARE	Australian Bureau of Agricultural and Resource Economics
APTINDO	Asosiasi Pengusaha Tepung Terigu Indonesia
APW	Australian Premium White
AQIS	Australian Quarantine and Inspection Service
ASW	Australian Standard White
BPS	Badan Pusat Statistik
BMG	Badan Meterologi, Klimatologi dan Geofisika
BULOG	Badan Urusan Logistik
CIF	Cost Insurance Freight
DEPDAG	Departemen Perdagangan
DFAT	Department of Foreign Affairs and Trade
FOB	Free On Board
HUBLA	Perhubungan Laut
ITS	Institut Teknologi Sepuluh Nopember Surabaya
MT	Million-Tonnes
SME	Small and Medium Enterprise
TEU	Twenty equivalent units
WEA	Wheat Export Authority
3 P/L	Third Party Logistics
4 P/L	Fourth Party Logistics
SWN	Standard wheat noodle
WEA	Wheat Exports Australia

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